

Claims:

1. A cooling apparatus for causing patient hypothermia, comprising:  
a flexible catheter;  
an inflatable balloon attached near a distal end of said catheter;  
at least one blood flow passageway formed through the interior of said balloon,  
said at least one blood flow passageway extending from a proximal blood  
flow port in a proximal exterior face of said balloon to a distal blood flow  
port in a distal exterior face of said balloon;  
a cooling fluid supply lumen formed in said catheter;  
a cooling fluid supply port in said catheter, connecting said cooling fluid supply  
lumen to the interior of said balloon;  
a cooling fluid return lumen formed in said catheter; and  
a cooling fluid return port in said catheter, connecting the interior of said balloon  
to said cooling fluid return lumen, wherein said at least one blood flow passageway is  
formed from a polymer film.
2. A cooling apparatus as recited in claim 1, wherein said at least one blood flow  
passageway is formed from a metallized polymer film having metal layers formed on  
both interior and exterior surfaces.
3. A cooling apparatus as recited in claim 1, wherein said at least one blood flow  
passageway is formed from a polymer film loaded with metal particles.
4. An apparatus as recited in claim 1, wherein said balloon is inflatable to a  
substantially cylindrical shape.
5. An apparatus as recited in claim 1, wherein said at least one blood flow  
passageway assumes a substantially tubular shape upon inflation of said balloon.

6. An apparatus as recited in claim 1, further comprising a guidewire lumen formed in said catheter.

7. An apparatus as recited in claim 1, further comprising a plurality of blood flow passageways formed through the interior of said balloon, each of said blood flow passageways extending from a proximal blood flow port in a proximal exterior face of said balloon to a distal blood flow port in a distal exterior face of said balloon.

8. An apparatus as recited in claim 1, wherein said at least one blood flow passageway is formed from a material having high thermal conductivity.

9. A method of changing the temperature of a patient, comprising:

providing an apparatus having a flexible multi-lumen catheter, an inflatable balloon attached near a distal end of said catheter, and at least one blood flow passageway formed through the interior of said balloon from a proximal blood flow port in a proximal exterior face of said balloon to a distal blood flow port in a distal exterior face of said balloon;

introducing said apparatus through the vascular system of a patient to a selected location in a blood vessel;

introducing a heat transfer fluid through a first lumen of said catheter to the interior of said balloon, thereby inflating said balloon to contact the walls of said selected blood vessel, and thereby allowing blood flow through the interior of said at least one blood flow passageway;

circulating said heat transfer fluid through the interior of said balloon and out of said balloon through a second lumen of said catheter, thereby changing the temperature of the wall of said at least one blood flow passageway, while maintaining said balloon in said inflated state; and

changing the temperature of said blood flowing through said selected blood vessel by contact with the wall of said at least one blood flow passageway.